PATENT COOPERATION TREATY

10/07-0293

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING SUBMISSION OR TRANSMITTAL OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

YABLON, Jay, R.
Law Office of Jay R. Yablon
910 Northumberland Drive
Schenectady, NY 12309-2814
ETATS-UNIS D'AMERIQUE

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Date of mailing (day/month/year) 13 May 2002 (13.05.02)	
Applicant's or agent's file reference ILKP004PCT	**IMPORTANT NOTIFICATION**
International application No. PCT/US99/20568	International filing date (day/month/year) 13 September 1999 (13.09.99)
International publication date (day/month/year) 22 March 2001 (22.03.01)	Priority date (day/month/year) 10 September 1999 (10.09.99)
Applicant NORTHAMERICAN INDUSTRIAL SERVICES, INC. (NAIS) et al	

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1. The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).

2. This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.

3. An **asterisk(*)** appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

4. The **letters "NR"** appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

Priority date	Priority application No.	Country or regional Office or PCT receiving Office	Date of receipt of priority document
10 Sept 1999 (10.09.99)	09/394,377	US	01 May 2002 (01.05.02)

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer PETRESKA Gorica
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 21 June 2001 (21.06.01)	
International application No. PCT/US99/20568	**Applicant's or agent's file reference** ILKP004PCT
International filing date (day/month/year) 13 September 1999 (13.09.99)	**Priority date** (day/month/year) 10 September 1999 (10.09.99)
Applicant ZILKA, Francis et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

22 March 2001 (22.03.01)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Antonia Muller
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

10/070293

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
ZILKP004PCT		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US 99/20568	13/09/1999	
Applicant		
NORTHAMERICAN INDUSTRIAL SERVICES, INC.(NAIS)et al		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 3

   [X] as suggested by the applicant.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
PC[redacted] 99/20568

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F27D23/02 F27D1/16 B08B7/00 F27D1/12 F28G7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 F27D F23J F28G B08B F28D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 769 034 A (F.ZILKA) 23 June 1998 (1998-06-23) claims; figures	1-67
A	US 2 840 365 A (G.KRUK) 24 June 1958 (1958-06-24) cited in the application claims; figures	
A	LU 41 977 A (P.GOFFART) 30 August 1962 (1962-08-30) cited in the application claims; figures	
A	BE 538 867 A (G.KRUKK) 30 June 1955 (1955-06-30) claims	

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 February 2000	01/03/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Coulomb, J

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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/[redacted] 99/20568

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 823 353 A (E.I.DU PONT DE NEMOURS AND CY) 11 November 1959 (1959-11-11) claims; figures	
A	US 5 211 135 A (P.A.CORREIA) 18 May 1993 (1993-05-18) cited in the application	
A	US 3 053 525 A (P.LEROY) 11 September 1962 (1962-09-11) claims; figures	
A	DATABASE WPI Section Ch, Week 9504 Derwent Publications Ltd., London, GB; Class J09, AN 95-027953 XP002061356 & JP 06 313532 A (SHINAGAWA FIRE BRICK), 8 November 1994 (1994-11-08) abstract	

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PC[redacted]S 99/20568

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5769034 A	23-06-1998	AU 6025398 A	07-08-1998
		EP 0974035 A	26-01-2000
		NO 993503 A	17-09-1999
		WO 9831975 A	23-07-1998
US 2840365 A	24-06-1958	NONE	
LU 41977 A	30-08-1962	NONE	
BE 538867 A		NONE	
GB 823353 A		NONE	
US 5211135 A	18-05-1993	NONE	
US 3053525 A	11-09-1962	FR 74111 E	03-03-1961
		FR 1183569 A	09-07-1959
		GB 879448 A	
JP 6313532 A	08-11-1994	JP 2774918 B	09-07-1998

We claim:

1. An explosives-based system for deslagging a hot online heat-exchange device (31), comprising:

an explosive device (101);

at least one cooling apparatus (104) cooling said explosive device (101) by gas, insulating or casing cooling means, particularly while said explosive device (101) is at any desired location within said hot online heat exchange device (31), thereby preventing heat from said hot online heat exchange device (31) from detonating said explosive device (101) prior to a time when it is desired to detonate at will said explosive device (101);

a cooling apparatus and explosive positioning system (12, 106, 112) with said at least one cooling apparatus (104) and said explosive device (101) cooled thereby affixed thereto (12, 106, 112), enabling a force applied to said cooling apparatus and explosive positioning system (12, 106, 112) to freely move said at least one cooling apparatus (104) and said explosive device (101) cooled thereby to said any desired location within said hot online heat exchange device (31) and particularly into a proper position for deslagging, while cooling said explosive device (101); and detonating means for detonating at will said explosive device (101).

2. The system of claim 1, said at least one cooling apparatus comprising:

a coolant-delivery apparatus (12, 106) delivering a gas coolant to said explosive device, said coolant so-cooling said explosive device (101).

3. The system of claim 2, said gas coolant comprising air.

4. The system of claim 2, said coolant-delivery apparatus comprising a semipermeable (105) cooling envelope, thereby enabling said gas coolant to flow continuously into, through, and out of said cooling envelope (104) and so-cool said explosive device (101).

5. The system of claim 2, said coolant-delivery apparatus comprising a cooling envelope (104) further comprising a release valve (130), thereby enabling said gas coolant to flow continuously into, through, and out of said cooling envelope (104) and so-cool said explosive device (101).

6. The system of claim 1, said at least one cooling apparatus comprising at least one cooling envelope in turn comprising an insulating one of said cooling envelopes (104) comprising:

an outer insulating layer (502) comprising at least one layer of at least one heat insulating material insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby preventing from overheating, and so-cooling, said explosive device (101).

7. The system of claim 6, said insulating one of said cooling envelopes (104) further comprising:

an inner insulating layer (504) comprising at least one heat-reflective material further

insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), by reflecting any heat penetrating said outer insulating layer (502) away from said explosive device (101).

8. The system of claim 7, further comprising:

non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104), further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101).

9. The system of claim 7, further comprising:

non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101).

10. The system of claim 6, said at least one layer of said at least one heat insulating material selected from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

11. The system of claim 7, said at least one heat-reflective material selected from the heat-reflective material group consisting of:

treated and untreated: aluminized cloth; silica cloth; fiberglass cloth; ceramic cloth; and stainless steel cloth.

12. The system of claim 8, said non-flammable bulk fiber insulation (506) comprising at least one heat insulating material selected from the heat insulator group consisting of:

treated and untreated: amorphous silica fiber; silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

13. The system of claim 1, said at least one cooling apparatus comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an

outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

14. The system of claim 13, further comprising a non-heat-resistant explosive casing (608) encasing said explosive material (606), wherein said non-heat-resistant explosive casing (608) and said explosive material (606) therein is encased within said heat-resistant explosive casing (602).

15. The system of claim 13, said heat-resistant explosive casing (602) comprising at least one layer of at least one heat insulating material selected from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

16. The system of claim 2, said at least one cooling apparatus further comprising at least one cooling envelope further comprising an insulating one of said cooling envelopes (104), said insulating one of said cooling envelopes (104) comprising:

an outer insulating layer (502) comprising at least one layer of at least one heat insulating material insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby preventing from overheating, and so-cooling, said explosive device (101).

17. The system of claim 16, said insulating one of said cooling envelopes (104) further comprising:

an inner insulating layer (504) comprising at least one heat-reflective material further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), by reflecting any heat penetrating said outer insulating layer (502) away from said explosive device (101).

18. The system of claim 16, further comprising:

non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101).

19. The system of claim 17, further comprising:

non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said

explosive device (101).

20. The system of claim 2, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

21. The system of claim 6, said at least one cooling envelope comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

22. The system of claim 7, said at least one cooling envelope comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

23. The system of claim 8, said at least one cooling envelope comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from

overheating by said heat-resistant explosive casing (602).

24. The system of claim 9, said at least one cooling envelope comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

25. The system of claim 16, said at least one cooling envelope comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

26. The system of claim 17, said at least one cooling envelope comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

27. The system of claim 18, said at least one cooling envelope comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

28. The system of claim 19, said at least one cooling envelope comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

29. A heat-resistant explosive device (101) to facilitate controlled explosive detonation in a hot surrounding environment, comprising:

a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

30. The heat-resistant explosive device (101) of claim 29, said heat-resistant explosive casing (602) comprising at least one layer of at least one heat insulating material selected from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

31. The heat-resistant explosive device (101) of claim 29, further comprising a non-heat-resistant explosive casing (608) encasing said explosive material (606), wherein said non-heat-resistant explosive casing (608) and said explosive material (606) therein is encased within said heat-resistant explosive casing (602).

32. A method for deslagging a hot, online heat-exchange device (31), comprising the steps of:

cooling an explosive device (101) by gas, insulating or casing cooling means, particularly while said explosive device (101) is at any desired location within said hot online heat exchange device (31), thereby preventing heat from said hot online heat exchange device (31) from detonating said explosive device (101) prior to a time when it is desired to detonate at will said explosive device (101);

affixing said at least one cooling apparatus (104) and said explosive device (101) cooled

thereby to a cooling apparatus and explosive positioning system (12, 106, 112);

applying a force to said cooling apparatus and explosive positioning system (12, 106, 112) and thereby freely moving said at least one cooling apparatus (104) and said explosive device (101) cooled thereby to said any desired location within said hot online heat exchange device (31) and particularly into a proper position for deslagging, while cooling said explosive device (101); and

detonating at will said explosive device (101).

33. The method of claim 32, further comprising the step of:

delivering a gas coolant to said explosive device, said coolant so-cooling said explosive device (101), using a coolant-delivery apparatus (12, 106).

34. The method of claim 33, said gas coolant comprising air.

35. The method of claim 33, said coolant-delivery apparatus comprising a semipermeable cooling envelope, further comprising the step of:

flowing said gas coolant continuously into, through, and out of said cooling envelope (104) and so-cooling said explosive device (101).

36. The method of claim 33, said coolant-delivery apparatus comprising a cooling envelope, further comprising the step of:

flowing said gas coolant continuously into, through, and out of said cooling envelope (104) and so-cooling said explosive device (101), using a release valve (130) of said cooling envelope (104).

37. The method of claim 32, said at least one cooling apparatus comprising at least one cooling envelope in turn comprising an insulating one of said cooling envelopes, further comprising the step of:

insulating, said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby preventing from overheating, and so-cooling, said explosive device (101), using an outer insulating layer (502) of said insulating one of said cooling envelopes (104) comprising at least one layer of at least one heat insulating material.

38. The method of claim 37, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), by reflecting any heat penetrating said outer insulating layer (502) away from said explosive device (101), using an inner insulating layer (504) of said insulating one of said cooling envelopes (104) comprising at least one heat-reflective material.

39. The method of claim 37, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), using non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) .

40. The method of claim 38, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), using non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) .

41. The method of claim 37, further comprising the step of selecting said at least one layer of said at least one heat insulating material from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

42. The method of claim 38, further comprising the step of selecting said at least one heat-reflective material from the heat-reflective material group consisting of:

treated and untreated: aluminized cloth; silica cloth; fiberglass cloth; ceramic cloth; and stainless steel cloth.

43. The method of claim 39, said non-flammable bulk fiber insulation (506) comprising at least one heat insulating material, further comprising the step of selecting said at least one heat insulating material from the heat insulator group consisting of:

treated and untreated: amorphous silica fiber; silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

44. The method of claim 32, said at least one cooling apparatus comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and

preventing from overheating, said detonator cap (102).

45. The method of claim 44, comprising the further steps of:

encasing said explosive material (606) in a non-heat-resistant explosive casing (608); and encasing said non-heat-resistant explosive casing (608) and said explosive material (606) therein within said heat-resistant explosive casing (602).

46. The method of claim 44, comprising the further step of selecting at least one layer of at least one heat insulating material of said heat-resistant explosive casing (602) from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

47. The method of claim 33, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising an insulating one of said cooling envelopes, further comprising the step of:

insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby preventing from overheating, and so-cooling, said explosive device (101), using an outer insulating layer (502) of said insulating one of said cooling envelopes (104) comprising at least one layer of at least one heat insulating material.

48. The method of claim 47, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), by reflecting any heat penetrating said outer insulating layer (502) away from said explosive device (101), using an inner insulating layer (504) of said insulating one of said cooling envelopes (104) comprising at least one heat-reflective material.

49. The method of claim 47, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), using non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) .

50. The method of claim 48, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), using non-flammable bulk fiber insulation (506) within said insulating

one of said cooling envelopes (104).

51. The method of claim 33, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

52. The method of claim 37, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

53. The method of claim 38, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

54. The method of claim 39, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further

steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

55. The method of claim 40, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

56. The method of claim 47, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

57. The method of claim 48, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and

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preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

58. The method of claim 49, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

59. The method of claim 50, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

60. A method for facilitating controlled explosive detonation in a hot surrounding environment, comprising the steps of providing a heat-resistant explosive device (101) for said controlled explosive detonation by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising a casing cooling envelope (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface

of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

61. The method of claim 60, comprising the further steps of:

encasing said explosive material (606) in a non-heat-resistant explosive casing (608); and

encasing said non-heat-resistant explosive casing (608) and said explosive material (606) therein within said heat-resistant explosive casing (602).

62. The method of claim 61, comprising the further step of selecting at least one layer of at least one heat insulating material of said heat-resistant explosive casing (602) from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted-silica-glass.

63. The system of claim 1, wherein said explosive device is substantially fixed relative to said cooling apparatus.

64. The system of claim 2, wherein said explosive device is substantially fixed relative to said cooling apparatus.

65. The system of claim 1, wherein said any desired location within said hot online heat exchange device comprises a furnace region of said hot online heat exchange device.

66. The system of claim 1, wherein said any desired location within said hot online heat exchange device comprises a region other than a furnace region of said hot online heat exchange device.

67. The system of claim 1, wherein said any desired location within said hot online heat exchange device is proximate the heat of a furnace of said hot online heat exchange device.

68. The system of claim 1, wherein said any desired location within said hot online heat exchange device is not proximate the heat of a furnace of said hot online heat exchange device.

69. The system of claim 2, wherein said any desired location within said hot online heat exchange device comprises a furnace region of said hot online heat exchange device.

70. The system of claim 2, wherein said any desired location within said hot online heat exchange device comprises a region other than a furnace region of said hot online heat exchange device.

71. The system of claim 2, wherein said any desired location within said hot online heat exchange device is proximate the heat of a furnace of said hot online heat exchange device.

72. The system of claim 2, wherein said any desired location within said hot online heat

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exchange device is not proximate the heat of a furnace of said hot online heat exchange device.

73. The method of claim 32, wherein said explosive device is substantially fixed relative to said cooling apparatus.

74. The method of claim 33, wherein said explosive device is substantially fixed relative to said cooling apparatus.

75. The method of claim 32, wherein said any desired location within said hot online heat exchange device comprises a furnace region of said hot online heat exchange device.

76. The method of claim 32, wherein said any desired location within said hot online heat exchange device comprises a region other than a furnace region of said hot online heat exchange device.

77. The method of claim 32, wherein said any desired location within said hot online heat exchange device is proximate the heat of a furnace of said hot online heat exchange device.

78. The method of claim 32, wherein said any desired location within said hot online heat exchange device is not proximate the heat of a furnace of said hot online heat exchange device.

79. The method of claim 33, wherein said any desired location within said hot online heat exchange device comprises a furnace region of said hot online heat exchange device.

80. The method of claim 33, wherein said any desired location within said hot online heat exchange device comprises a region other than a furnace region of said hot online heat exchange device.

81. The method of claim 33, wherein said any desired location within said hot online heat exchange device is proximate the heat of a furnace of said hot online heat exchange device.

82. The method of claim 33, wherein said any desired location within said hot online heat exchange device is not proximate the heat of a furnace of said hot online heat exchange device.

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F27D23/02 F27D1/16 B08B7/00 F27D1/12 F28G7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 F27D F23J F28G B08B F28D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 769 034 A (F.ZILKA) 23 June 1998 (1998-06-23) claims; figures ---	1-67
A	US 2 840 365 A (G.KRUK) 24 June 1958 (1958-06-24) cited in the application claims; figures ---	
A	LU 41 977 A (P.GOFFART) 30 August 1962 (1962-08-30) cited in the application claims; figures ---	
A	BE 538 867 A (G.KRUKK) 30 June 1955 (1955-06-30) claims ---	
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 February 2000	01/03/2000

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

Int [redacted]pplication No
PCT/[redacted]99/20568

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category ³	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	GB 823 353 A (E.I.DU PONT DE NEMOURS AND CY) 11 November 1959 (1959-11-11) claims; figures	
A	US 5 211 135 A (P.A.CORREIA) 18 May 1993 (1993-05-18) cited in the application	
A	US 3 053 525 A (P.LEROY) 11 September 1962 (1962-09-11) claims; figures	
A	DATABASE WPI Section Ch, Week 9504 Derwent Publications Ltd., London, GB; Class J09, AN 95-027953 XP002061356 & JP 06 313532 A (SHINAGAWA FIRE BRICK), 8 November 1994 (1994-11-08) abstract	

1

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Information [redacted] patent family members

Int [redacted] Application No
PCT/[redacted]99/20568

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We claim:

1. An explosives-based system for deslagging a hot online heat-exchange device (31), comprising:

an explosive device (101);

at least one cooling envelope (104) cooling said explosive device (101) particularly while said explosive device (101) is within said hot online heat exchange device (31), thereby preventing heat from said hot online heat exchange device (31) from detonating said explosive device (101) prior to a time when it is desired to detonate at will said explosive device (101), wherein said explosive device (101) is substantially fixed relative to and within said at least one cooling envelope (104);

envelope and explosive positioning means (12, 106, 112) with said at least one cooling envelope (104) and said explosive device (101) cooled therein affixed proximate a second of two ends of said envelope and explosive positioning means (12, 106, 112), enabling at least one person holding and moving a first of said two ends of said envelope and explosive positioning means (12, 106, 112) to freely move said at least one cooling envelope (104) and said explosive device (101) cooled therein to any desired location within said hot online heat exchange device (31) and particularly into a proper position for deslagging, while said at least one cooling envelope (104) cools said explosive device (101), and while said at least one person remains outside said hot, online heat exchange device (31); and

detonating means for detonating at will said explosive device (101).

2. The system of claim 1, further comprising:

coolant-delivery means (12, 106) delivering a continuous flow of coolant into a coolant-supplying one of said cooling envelopes (104), said coolant surrounding and so-cooling said explosive device (101).

3. The system of claim 2, said coolant comprising a liquid.

4. The system of claim 3, the liquid coolant comprising water.

5. The system of claim 2, said coolant comprising a gas.

6. The system of claim 5, the gaseous coolant comprising air.

7. The system of claim 2, wherein said coolant-supplying one of said cooling envelopes (104) is semipermeable (105), thereby enabling said coolant to flow continuously into, through, and out of said coolant-supplying one of said cooling envelopes (104) and so-cool said explosive device (101).

8. The system of claim 2, said coolant-supplying one of said cooling envelopes (104) further

comprising a release valve (130), thereby enabling said coolant to flow continuously into, through, and out of said coolant-supplying one of said cooling envelopes (104) and so-cool said explosive device (101).

9. The system of claim 1, an insulating one of said cooling envelopes (104) comprising:

an outer insulating layer (502) comprising at least one layer of at least one heat insulating material insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby preventing from overheating, and so-cooling, said explosive device (101).

10. The system of claim 9, said insulating one of said cooling envelopes (104) further comprising:

an inner insulating layer (504) comprising at least one heat-reflective material further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), by reflecting any heat penetrating said outer insulating layer (502) away from said explosive device (101).

11. The system of claim 9, further comprising:

non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104), further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101).

12. The system of claim 10, further comprising:

non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101).

13. The system of claim 9, said at least one layer of said at least one heat insulating material selected from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

14. The system of claim 10, said at least one heat-reflective material selected from the heat-reflective material group consisting of:

treated and untreated: aluminized cloth; silica cloth; fiberglass cloth; ceramic cloth; and

stainless steel cloth.

15. The system of claim 11, said non-flammable bulk fiber insulation (506) comprising at least one heat insulating material selected from the heat insulator group consisting of:

treated and untreated: amorphous silica fiber; silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

16. The system of claim 1, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

17. The system of claim 16, further comprising a non-heat-resistant explosive casing (608) encasing said explosive material (606), wherein said non-heat-resistant explosive casing (608) and said explosive material (606) therein is encased within said heat-resistant explosive casing (602).

18. The system of claim 16, said heat-resistant explosive casing (602) comprising at least one layer of at least one heat insulating material selected from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

19. The system of claim 2, further comprising an insulating one of said cooling envelopes (104), said insulating one of said cooling envelopes (104) comprising:

an outer insulating layer (502) comprising at least one layer of at least one heat insulating material insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby preventing from overheating, and so-cooling, said explosive device (101).

20. The system of claim 19, said insulating one of said cooling envelopes (104) further comprising:

an inner insulating layer (504) comprising at least one heat-reflective material further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), by reflecting any heat penetrating said outer insulating layer (502) away from said explosive device (101).

21. The system of claim 19, further comprising:

non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101).

22. The system of claim 20, further comprising:

non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101).

23. The system of claim 2, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

24. The system of claim 9, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

25. The system of claim 10, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising a casing one of said cooling

envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

26. The system of claim 11, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

27. The system of claim 12, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

28. The system of claim 19, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

29. The system of claim 20, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from

an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

30. The system of claim 21, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

31. The system of claim 22, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

32. A heat-resistant explosive device (101) to facilitate controlled explosive detonation in a hot surrounding environment, comprising:

a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

33. The heat-resistant explosive device (101) of claim 32, said heat-resistant explosive casing (602) comprising at least one layer of at least one heat insulating material selected from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

34. The heat-resistant explosive device (101) of claim 32, further comprising a non-heat-resistant explosive casing (608) encasing said explosive material (606), wherein said non-heat-resistant explosive casing (608) and said explosive material (606) therein is encased within said heat-resistant explosive casing (602).

35. A method for deslagging a hot, online heat-exchange device (31), comprising the steps of:

cooling an explosive device (101) particularly while said explosive device (101) is within said hot online heat exchange device (31), thereby preventing heat from said hot online heat exchange device (31) from detonating said explosive device (101) prior to a time when it is desired to detonate at will said explosive device (101), using at least one cooling envelope (104), wherein said explosive device (101) is substantially fixed relative to and within said at least one cooling envelope (104);

affixing said at least one cooling envelope (104) and said explosive device (101) cooled therein proximate a second of said two ends of an envelope and explosive positioning means (12, 106, 112);

holding and moving a first of two ends of said envelope and explosive positioning means (12, 106, 112) and thereby freely moving said at least one cooling envelope (104) and said explosive device (101) cooled therein to any desired location within said hot online heat exchange device (31) and particularly into a proper position for deslagging, while cooling said explosive device (101) using said at least one cooling envelope (104) , and while remaining outside said hot, online heat exchange device (31); and

detonating at will said explosive device (101).

36. The method of claim 35, further comprising the step of:

delivering a continuous flow of coolant into a coolant-supplying one of said cooling envelopes (104), said coolant surrounding and so-cooling said explosive device (101), using coolant-delivery means (12, 106).

37. The method of claim 36, said coolant comprising a liquid.

38. The method of claim 37, the liquid coolant comprising water.

39. The method of claim 36, said coolant comprising a gas.

40. The method of claim 39, the gaseous coolant comprising air.

41. The method of claim 36, further comprising the step of:

flowing said coolant continuously into, through, and out of said coolant-supplying one of said cooling envelopes (104) and so-cooling said explosive device (101), because of said coolant-supplying one of said cooling envelopes (104) being semipermeable (105).

42. The method of claim 36, further comprising the step of:

flowing said coolant continuously into, through, and out of said coolant-supplying one of said cooling envelopes (104) and so-cooling said explosive device (101), using a release valve (130) of said coolant-supplying one of said cooling envelopes (104).

43. The method of claim 35, further comprising the step of:

insulating, said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby preventing from overheating, and so-cooling, said explosive device (101), using an outer insulating layer (502) of an insulating one of said cooling envelopes (104) comprising at least one layer of at least one heat insulating material.

44. The method of claim 43, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), by reflecting any heat penetrating said outer insulating layer (502) away from said explosive device (101), using an inner insulating layer (504) of said insulating one of said cooling envelopes (104) comprising at least one heat-reflective material.

45. The method of claim 43, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), using non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) .

46. The method of claim 44, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), using non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) .

47. The method of claim 43, further comprising the step of selecting said at least one layer of said at least one heat insulating material from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

48. The method of claim 44, further comprising the step of selecting said at least one heat-reflective material from the heat-reflective material group consisting of:

treated and untreated: aluminized cloth; silica cloth; fiberglass cloth; ceramic cloth; and stainless steel cloth.

49. The method of claim 45, said non-flammable bulk fiber insulation (506) comprising at least one heat insulating material, further comprising the step of selecting said at least one heat insulating material from the heat insulator group consisting of:

treated and untreated: amorphous silica fiber; silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

50. The method of claim 35, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

51. The method of claim 50, comprising the further steps of:

encasing said explosive material (606) in a non-heat-resistant explosive casing (608); and

encasing said non-heat-resistant explosive casing (608) and said explosive material (606) therein within said heat-resistant explosive casing (602).

52. The method of claim 50, comprising the further step of selecting at least one layer of at least one heat insulating material of said heat-resistant explosive casing (602) from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

53. The method of claim 36, further comprising the step of:

insulating said explosive device (101) from said heat from said hot online heat

exchange device (31), and thereby preventing from overheating, and so-cooling, said explosive device (101), using an outer insulating layer (502) of an insulating one of said cooling envelopes (104) comprising at least one layer of at least one heat insulating material.

54. The method of claim 53, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), by reflecting any heat penetrating said outer insulating layer (502) away from said explosive device (101), using an inner insulating layer (504) of said insulating one of said cooling envelopes (104) comprising at least one heat-reflective material.

55. The method of claim 53, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), using non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) .

56. The method of claim 54, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), using non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) .

57. The method of claim 36, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

58. The method of claim 43, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

59. The method of claim 44, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

60. The method of claim 45, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

61. The method of claim 46, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

62. The method of claim 53, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

63. The method of claim 54, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

64. The method of claim 55, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

65. The method of claim 56, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably

insulating and preventing from overheating, said detonator cap (102).

66. A method for facilitating controlled explosive detonation in a hot surrounding environment, comprising the steps of providing a heat-resistant explosive device (101) for said controlled explosive detonation by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising a casing cooling envelope (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

67. The method of claim 66, comprising the further steps of:

encasing said explosive material (606) in a non-heat-resistant explosive casing (608); and

encasing said non-heat-resistant explosive casing (608) and said explosive material (606) therein within said heat-resistant explosive casing (602).

68. The method of claim 66, comprising the further step of selecting at least one layer of at least one heat insulating material of said heat-resistant explosive casing (602) from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

REPLACED BY ART 34 AMDT

AMENDED CLAIMS

[received by the International Bureau on 1st May 2000 (01.05.00);
original claims 1-68 replaced by new claims 1-84 (14 pages)]

1. An explosives-based system for deslagging a hot online heat-exchange device (31), comprising:

an explosive device (101);

at least one cooling apparatus (104) cooling said explosive device (101) by non-liquid cooling means, particularly while said explosive device (101) is at any desired location within said hot online heat exchange device (31), thereby preventing heat from said hot online heat exchange device (31) from detonating said explosive device (101) prior to a time when it is desired to detonate at will said explosive device (101);

a cooling apparatus and explosive positioning system (12, 106, 112) with said at least one cooling apparatus (104) and said explosive device (101) cooled thereby affixed thereto (12, 106, 112), enabling a force applied to said cooling apparatus and explosive positioning system (12, 106, 112) to freely move said at least one cooling apparatus (104) and said explosive device (101) cooled thereby to said any desired location within said hot online heat exchange device (31) and particularly into a proper position for deslagging, while cooling said explosive device (101); and detonating means for detonating at will said explosive device (101).

2. The system of claim 1, said at least one cooling apparatus comprising:

a coolant-delivery apparatus (12, 106) delivering a non-liquid coolant to said explosive device, said coolant so-cooling said explosive device (101).

3. The system of claim 2, said non-liquid coolant comprising a gas.

4. The system of claim 3, the gaseous coolant comprising air.

5. The system of claim 2, said coolant-delivery apparatus comprising a semipermeable (105) cooling envelope, thereby enabling said non-liquid coolant to flow continuously into, through, and out of said cooling envelope (104) and so-cool said explosive device (101).

6. The system of claim 2, said coolant-delivery apparatus comprising a cooling envelope (104) further comprising a release valve (130), thereby enabling said non-liquid coolant to flow continuously into, through, and out of said cooling envelope (104) and so-cool said explosive device (101).

7. The system of claim 1, said at least one cooling apparatus comprising at least one cooling envelope in turn comprising an insulating one of said cooling envelopes (104) comprising:

an outer insulating layer (502) comprising at least one layer of at least one heat insulating material insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby preventing from overheating, and so-cooling, said explosive device

(101).

8. The system of claim 7, said insulating one of said cooling envelopes (104) further comprising:

an inner insulating layer (504) comprising at least one heat-reflective material further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), by reflecting any heat penetrating said outer insulating layer (502) away from said explosive device (101).

9. The system of claim 8, further comprising:

non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104), further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101).

10. The system of claim 8, further comprising:

non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101).

11. The system of claim 7, said at least one layer of said at least one heat insulating material selected from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

12. The system of claim 8, said at least one heat-reflective material selected from the heat-reflective material group consisting of:

treated and untreated: aluminized cloth; silica cloth; fiberglass cloth; ceramic cloth; and stainless steel cloth.

13. The system of claim 9, said non-flammable bulk fiber insulation (506) comprising at least one heat insulating material selected from the heat insulator group consisting of:

treated and untreated: amorphous silica fiber; silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

14. The system of claim 1, said at least one cooling apparatus comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, said explosive device (101)

further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

15. The system of claim 14, further comprising a non-heat-resistant explosive casing (608) encasing said explosive material (606), wherein said non-heat-resistant explosive casing (608) and said explosive material (606) therein is encased within said heat-resistant explosive casing (602).

16. The system of claim 14, said heat-resistant explosive casing (602) comprising at least one layer of at least one heat insulating material selected from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

17. The system of claim 2, said at least one cooling apparatus further comprising at least one cooling envelope further comprising an insulating one of said cooling envelopes (104), said insulating one of said cooling envelopes (104) comprising:

an outer insulating layer (502) comprising at least one layer of at least one heat insulating material insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby preventing from overheating, and so-cooling, said explosive device (101).

18. The system of claim 17, said insulating one of said cooling envelopes (104) further comprising:

an inner insulating layer (504) comprising at least one heat-reflective material further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), by reflecting any heat penetrating said outer insulating layer (502) away from said explosive device (101).

19. The system of claim 17, further comprising:

non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) further insulating said explosive device (101) from said heat from said hot

online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101).

20. The system of claim 18, further comprising:

non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101).

21. The system of claim 2, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

22. The system of claim 7, said at least one cooling envelope comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

23. The system of claim 8, said at least one cooling envelope comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

24. The system of claim 9, said at least one cooling envelope comprising a casing one of said

cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

25. The system of claim 10, said at least one cooling envelope comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

26. The system of claim 17, said at least one cooling envelope comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

27. The system of claim 18, said at least one cooling envelope comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

28. The system of claim 19, said at least one cooling envelope comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

29. The system of claim 20, said at least one cooling envelope comprising a casing one of said cooling envelopes, said explosive device (101) further comprising:

a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

30. A heat-resistant explosive device (101) to facilitate controlled explosive detonation in a hot surrounding environment, comprising:

a heat-resistant explosive casing (602) comprising a casing one of said cooling envelopes (104), and further comprising a detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602) to provide suitable heat insulation to a detonator cap (102) placed within said detonator well (604); and

explosive material (606) encased within, and thereby insulated and prevented from overheating by said heat-resistant explosive casing (602).

31. The heat-resistant explosive device (101) of claim 30, said heat-resistant explosive casing (602) comprising at least one layer of at least one heat insulating material selected from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

32. The heat-resistant explosive device (101) of claim 30, further comprising a non-heat-resistant explosive casing (608) encasing said explosive material (606), wherein said non-heat-resistant explosive casing (608) and said explosive material (606) therein is encased within said heat-resistant explosive casing (602).

33. A method for deslagging a hot, online heat-exchange device (31), comprising the steps of:

cooling an explosive device (101) by non-liquid cooling means, particularly while said explosive device (101) is at any desired location within said hot online heat exchange device (31), thereby preventing heat from said hot online heat exchange device (31) from detonating said explosive device (101) prior to a time when it is desired to detonate at will said explosive device (101);

affixing said at least one cooling apparatus (104) and said explosive device (101) cooled thereby to a cooling apparatus and explosive positioning system (12, 106, 112);

applying a force to said cooling apparatus and explosive positioning system (12, 106, 112) and thereby freely moving said at least one cooling apparatus (104) and said explosive device (101) cooled thereby to said any desired location within said hot online heat exchange device (31) and particularly into a proper position for deslagging, while cooling said explosive device (101); and

detonating at will said explosive device (101).

34. The method of claim 33, further comprising the step of:

delivering a non-liquid coolant to said explosive device, said coolant so-cooling said explosive device (101), using a coolant-delivery apparatus (12, 106).

35. The method of claim 32, said non-liquid coolant comprising a gas.

36. The method of claim 35, the gaseous coolant comprising air.

37. The method of claim 34, said coolant-delivery apparatus comprising a semipermeable cooling envelope, further comprising the step of:

flowing said non-liquid coolant continuously into, through, and out of said cooling envelope (104) and so-cooling said explosive device (101).

38. The method of claim 34, said coolant-delivery apparatus comprising a cooling envelope, further comprising the step of:

flowing said non-liquid coolant continuously into, through, and out of said cooling envelope (104) and so-cooling said explosive device (101), using a release valve (130) of said cooling envelope (104).

39. The method of claim 33, said at least one cooling apparatus comprising at least one cooling envelope in turn comprising an insulating one of said cooling envelopes, further comprising the step of:

insulating, said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby preventing from overheating, and so-cooling, said explosive device (101), using an outer insulating layer (502) of said insulating one of said cooling envelopes (104)

comprising at least one layer of at least one heat insulating material.

40. The method of claim 39, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), by reflecting any heat penetrating said outer insulating layer (502) away from said explosive device (101), using an inner insulating layer (504) of said insulating one of said cooling envelopes (104) comprising at least one heat-reflective material.

41. The method of claim 39, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), using non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) .

42. The method of claim 40, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), using non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) .

43. The method of claim 39, further comprising the step of selecting said at least one layer of said at least one heat insulating material from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

44. The method of claim 40, further comprising the step of selecting said at least one heat-reflective material from the heat-reflective material group consisting of:

treated and untreated: aluminized cloth; silica cloth; fiberglass cloth; ceramic cloth; and stainless steel cloth.

45. The method of claim 41, said non-flammable bulk fiber insulation (506) comprising at least one heat insulating material, further comprising the step of selecting said at least one heat insulating material from the heat insulator group consisting of:

treated and untreated: amorphous silica fiber; silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

46. The method of claim 33, said at least one cooling apparatus comprising at least one cooling

envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

47. The method of claim 46, comprising the further steps of:

encasing said explosive material (606) in a non-heat-resistant explosive casing (608); and encasing said non-heat-resistant explosive casing (608) and said explosive material (606) therein within said heat-resistant explosive casing (602).

48. The method of claim 46, comprising the further step of selecting at least one layer of at least one heat insulating material of said heat-resistant explosive casing (602) from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

49. The method of claim 34, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising an insulating one of said cooling envelopes, further comprising the step of:

insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby preventing from overheating, and so-cooling, said explosive device (101), using an outer insulating layer (502) of said insulating one of said cooling envelopes (104) comprising at least one layer of at least one heat insulating material.

50. The method of claim 49, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), by reflecting any heat penetrating said outer insulating layer (502) away from said explosive device (101), using an inner insulating layer (504) of said insulating one of said cooling envelopes (104) comprising at least one heat-reflective material.

51. The method of claim 49, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), using non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) .

52. The method of claim 50, further comprising the step of:

further insulating said explosive device (101) from said heat from said hot online heat exchange device (31), and thereby further preventing from overheating, and so-cooling, said explosive device (101), using non-flammable bulk fiber insulation (506) within said insulating one of said cooling envelopes (104) .

53. The method of claim 34, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

54. The method of claim 39, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

55. The method of claim 40, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602)

comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

56. The method of claim 41, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

57. The method of claim 42, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

58. The method of claim 49, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant

explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

59. The method of claim 50, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

60. The method of claim 51, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

61. The method of claim 52, said at least one cooling apparatus further comprising at least one cooling envelope in turn comprising a casing one of said cooling envelopes, comprising the further steps of providing said explosive device (101) by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising said casing one of said cooling envelopes (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

62. A method for facilitating controlled explosive detonation in a hot surrounding environment, comprising the steps of providing a heat-resistant explosive device (101) for said controlled explosive detonation by:

encasing an explosive material (606) within a heat-resistant explosive casing (602) comprising a casing cooling envelope (104), and thereby insulating and preventing from overheating, said explosive material (606); and

placing a detonator cap (102) within a detonator well (604) of said heat-resistant explosive casing (602), said detonator well (604) sufficiently removed from an outside surface of said explosive device (101) and said explosive casing (602), thereby suitably insulating and preventing from overheating, said detonator cap (102).

63. The method of claim 62, comprising the further steps of:

encasing said explosive material (606) in a non-heat-resistant explosive casing (608); and

encasing said non-heat-resistant explosive casing (608) and said explosive material (606) therein within said heat-resistant explosive casing (602).

64. The method of claim 62, comprising the further step of selecting at least one layer of at least one heat insulating material of said heat-resistant explosive casing (602) from the heat insulator group consisting of:

treated and untreated: silica cloth; aluminized silica cloth; silicone coated silica cloth; fiberglass cloth; silicone impregnated fiberglass fabric; vermiculite coated fiberglass; neoprene coated fiberglass; ceramic cloth; and knitted silica glass.

65. The system of claim 1, wherein said explosive device is substantially fixed relative to said cooling apparatus.

66. The system of claim 2, wherein said explosive device is substantially fixed relative to said cooling apparatus.

67. The system of claim 1, wherein said any desired location within said hot online heat exchange device comprises a furnace region of said hot online heat exchange device.

68. The system of claim 1, wherein said any desired location within said hot online heat exchange device comprises a region other than a furnace region of said hot online heat exchange device.

69. The system of claim 1, wherein said any desired location within said hot online heat exchange device is proximate the heat of a furnace of said hot online heat exchange device.

70. The system of claim 1, wherein said any desired location within said hot online heat exchange device is not proximate the heat of a furnace of said hot online heat exchange device.

71. The system of claim 2, wherein said any desired location within said hot online heat exchange device comprises a furnace region of said hot online heat exchange device.

72. The system of claim 2, wherein said any desired location within said hot online heat exchange device comprises a region other than a furnace region of said hot online heat exchange device.

73. The system of claim 2, wherein said any desired location within said hot online heat exchange device is proximate the heat of a furnace of said hot online heat exchange device.

74. The system of claim 2, wherein said any desired location within said hot online heat exchange device is not proximate the heat of a furnace of said hot online heat exchange device.

75. The method of claim 33, wherein said explosive device is substantially fixed relative to said cooling apparatus.

76. The method of claim 34, wherein said explosive device is substantially fixed relative to said cooling apparatus.

77. The method of claim 33, wherein said any desired location within said hot online heat exchange device comprises a furnace region of said hot online heat exchange device.

78. The method of claim 33, wherein said any desired location within said hot online heat exchange device comprises a region other than a furnace region of said hot online heat exchange device.

79. The method of claim 33, wherein said any desired location within said hot online heat exchange device is proximate the heat of a furnace of said hot online heat exchange device.

80. The method of claim 33, wherein said any desired location within said hot online heat exchange device is not proximate the heat of a furnace of said hot online heat exchange device.

81. The method of claim 34, wherein said any desired location within said hot online heat exchange device comprises a furnace region of said hot online heat exchange device.

82. The method of claim 34, wherein said any desired location within said hot online heat exchange device comprises a region other than a furnace region of said hot online heat exchange device.

83. The method of claim 34, wherein said any desired location within said hot online heat exchange device is proximate the heat of a furnace of said hot online heat exchange device.

84. The method of claim 34, wherein said any desired location within said hot online heat exchange device is not proximate the heat of a furnace of said hot online heat exchange device.

Statement Explaining Amendments Under Article 19(1)

Claims 1, 2, 33 and 34 are amended to refer to "non-liquid" coolant and cooling means, and so do not attempt to claim the use of a liquid coolant and cooling means as disclosed by commonly-assigned and invented US patent 5,769,034, referenced in the international search report.

As stated at page 21, lines 26-30 of the disclosure, "the delivery of coolant to one or more explosive devices by any means obvious to someone of ordinary skill, enabling those explosive devices to be introduced into an on-line fuel-burning facility and then . . . detonated in a controlled manner, is contemplated by this disclosure and covered within the scope of its associated claims." Most of the remaining claims amendments are designed to capture the essence of the invention as described in these terms, and to avoid an interpretation that might require this "delivery of coolant to one or more explosive devices by any means obvious to someone of ordinary skill" to require the use of a preferred embodiment "cooling envelope" that literally comprises a physical "membrane."

New claims 65, 66 , 75 and 76 specify that the "explosive device is substantially fixed relative to said cooling apparatus," and as such, are simply subdivided out from claims 1 and 35, since the language they contain is not required to distinguish claims 1 and 35 over the prior art of record.

Four new claim groups 67 through 70, 71 through 74, and 77 through 80, and 81 through 84 specify *where* within the overall heat exchange device the deslagging takes place, in relation to the furnace region and the heat of the furnace. The furnace, and heat thereof, is referenced throughout the application disclosure. As regards these claims, it is abundantly clear from throughout applicant's original disclosure, for example, but not limited to, Fig. 3 and the associated discussion, that applicant's invention can be freely moved to and used to deslag *any desired location* within the hot online heat exchange, at *any desired temperature* region. That is, it is extremely well-established that applicant's invention is not restricted in terms of where within the heat exchange device it can effectively be used and in particular that there is no heat exchanger region within which the temperature is too hot for applicant's invention to be employed.

All of the remaining amendatory material submitted herewith simply modifies the remaining claim language so as to maintain proper claims consistency and construction throughout. Claims 1 and 33 are also amended and reworded slightly so as to remove non-essential limitations, such as the "at least one person holding and moving" the cooled explosive into deslagging position, and the aforementioned non-essential matter moved into dependent claims 65, 66, 75 and 76.

PATENT COOPERATION TREATY

PCT

REC'D 17 JAN 2002

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
ZILKP004PCT		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US99/20568	13/09/1999	10/09/1999
International Patent Classification (IPC) or national classification and IPC F27D23/02		
Applicant NORTHAMERICAN INDUSTRIAL SERVICES, INC.(NAIS)et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 14 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☒ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
22/03/2001	15.01.2002
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Bergman, L Telephone No. +49 89 2399 8443

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US99/20568

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-22	as originally filed				

Claims, No.:

1-82	as received on	09/01/2002	with letter of	19/12/2001	

Drawings, sheets:

1/6-6/6	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   - ☐ the description, pages:
   - ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)
   see separate sheet

6. Additional observations, if necessary:
   see separate sheet

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

   ☒ restricted the claims.

   ☐ paid additional fees.

   ☐ paid additional fees under protest.

   ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

   ☐ complied with.

   ☐ not complied with for the following reasons:

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

   ☐ all parts.

   ☒ the parts relating to claims Nos. 32-59.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 32-59
	No:	Claims
Inventive step (IS)	Yes:	Claims 37-59
	No:	Claims 32-36

Industrial applicability (IA) Yes: Claims 32-59
No: Claims

2. Citations and explanations
see separate sheet

Re Item I

Basis of the opinion

1. The amendment "cooling apparatus (104)" in place of "cooling envelop (104)" is not supported by the appliction as originally filed.

2. The subject matter of claims 63 -82 relates to unsearched subject matter contrary to the requirements of Rule 66(1) (e) PCT.

Re Item IV

Lack of unity of invention

1. The subject-matter of independent claim 1 is already known because D1 (US-A-5 769 034) discloses an explosion based system comprising an explosive device, an cooling apparatus, a positioning system and detonation means wherein a coolant, such as water, is delivered to the explosives in order to prevent them from detonation due to the heat from the on-line facility, cf. D1, abstract. claims, Figures. The system being suitable for cooling by the use of gas.

   The requisite unity of invention (Rule 13.1 PCT) therefore no longer exists inasmuch as a technical relationship involving one or more of the same or corresponding special technical features in the sense of Rule 13.2 PCT does not exist between the subject-matter of the following groups of dependent claims:

   1. Claim 1: An explosion based system comprising an explosive device, an cooling apparatus, a positioning system and detonation means

   2. Claim 32: A method for deslagging a heat exchanger device.

   3. Claim 60: A method for facilitating controlled explosive detonation in a hot surrounding environment.

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step

or industrial applicability; citations and explanations supporting such statement

1. Prior art

D1: US-A-5 769 034 (F.ZILKA) 23 June 1998 (1998-06-23)

D1 discloses an explosion based system comprising an explosive device, an cooling apparatus, a positioning system and detonation means wherein a coolant, such as water, is delivered to the explosives in order to prevent them from detonation due to the heat from the on-line facility, cf. D1, abstract. claims, Figures. D1 also discloses a method for deslagging a heat exchanger device by the use of the apparatus known from D1 by delivering a flow of coolant into the cooling envelop, cf. D1, claim 1, l. 53, Claim 12. Accordingly, D1 teaches that there is no need to shut down the device to be deslagged if the explosive is subjected to cooling when introduced and positioned within the device to be deslagged.

In order to properly cool the explosive, a cooling envelop 104 in the form of a semi-permeable membrane is provided which completely envelops the explosive. During operation, this envelope is subjected to cooling so that it will maintain the explosive device 101 in a cooled-down state until it is ready for detonation, cf. D1, col. 3, l. 49-65.

2. Novelty

The subject matter of claim 32 is novel since D1 does not disclose the feature of gas cooling or the feature of insulating the explosive device by an insulating or casing cooling means.

3. Inventive step

The use of a gas coolant means is considered to lie within the normal competence of a man skilled in the art because D1 it is one out of two possibilities (liquid or gas) for proving a flow of a coolant into the cooling envelop.

Accordingly, the subject matter of claims 32-36 lacks an inventive step.

The embodiments relating to insulating the explosive device from heat by the provision of an insulating or casing cooling means as defined in claims 37-59 is not rendered obvious by the cited prior art. Hence, the subject matter of claims 37-59 is considered to involve an inventive step.